1003-121 Left Ventricular Apical Remodeling in Chagas' Heart Disease Disrupts The Optimal Global Prolate-Ellipsoid LV Geometry – Evidence From a Quantitative Echocardiographic Regional and Global Shape Analysis Study

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LV dysfunction is known to occur in Chagas' heart disease (CD) but the precise changes in regional and global LV shape associated with CD and their relation to LV function have not been defined. To assess this, we used quantitative shape analysis in 2-D echo studies of 43 pts with CD and 20 normals (NL). In the apical long-axis views, we quantified the following: regional geometry by endocardial curvature (C, unitless), global shape by Fourier Shape Power Index (FSPI, unitless) and chamber elongation by the third component (F3). From the 4 chamber views, end-diastolic (ED) and end-systolic (ES) volumes (V) and LVEF were obtained. *Results:* (Mean ± SEM)

	NL	CD		NL	CD
ESC-Apex	29 ± 1	20 ± 2*	FSPI-ED	17 ± 1	10 ± 2*
ESC-Septum	8 ± 1	10 ± 1	FSPI-ES	31 ± 4	13 ± 1*
ESC-Posterior wall	−4 ± 1	−6 ± 1	F3-ED	0.37 ± 0.02	0.26 ± 0.01*
			F3-ES	0.44 ± 0.03	0.31 ± 0.02*

(*p < 0.05 vs. NL)

EDV (cc) in CD was 121 ± 10 vs. 87 ± 6 in NL (p = 0.045); % LVEF was 41 ± 3 in CD vs. 77 ± 2 in NL (p < 0.0001). In CD, 1) Reduced ES-C of apex is consistent with apical aneurysm. No other regional curvature changes were seen. 2) Decreased FSPI and F3 are consistent with globular LV and loss of elliptical shape. *Conclusion:* Quantitative evaluation of LV shape in CD demonstrates regional apical deformation as well as disruption of the optimal global prolate-ellipsoid shape, which may contribute to LV dysfunction.

1004 Advances in Contrast Echocardiography

Tuesday, March 18, 1997, Noon–2:00 p.m.
Anaheim Convention Center, Hall E
Presentation Hour: Noon–1:00 p.m.

1004-105 Analysis of Transmural Myocardial Intensity Profiles Produced by New Dodecafluoropentane Microbubbles: Implications Regarding Determinants of Opacification

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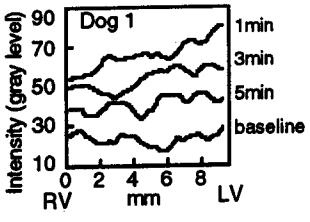
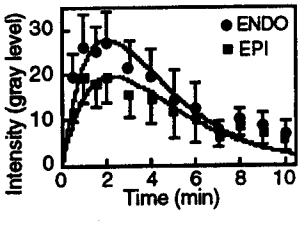
Previous microsphere studies have demonstrated that the transmural distribution of myocardial flow in anesthetized dogs is homogeneous, whereas vascular density increases from subepicardium (EPI) to subendocardium (ENDO). Therefore, the transmural distribution of contrast intensity should reflect the relative role of flow and vascular volume in producing myocardial opacification. We studied transmural intensities after injecting 0.15 ml/kg IV of a new preactivated dodecafluoropentane microbubble QW7437 (SONUS) capable of prolonged myocardial enhancement. We performed videointensity analysis on end-diastolic midventricular short-axis images in 6 anesthetized dogs. First, a rectangular region of interest (ROI) encompassed the septum and intensity (0–255 gray levels (GL)) was measured every 30 sec for 5 min. An intensity gradient increasing from RV to LV ENDO was observed (Fig. left). The maximal slope for pixel intensity versus distance from RV ENDO was 4.6 ± 2.6 GL/mm at 1.5 ± 0.8 min after injection. Next, to study the entire LV, time-intensity curves were obtained from ENDO and EPI halves of the entire LV circumference. Peak background subtracted intensity occurred at 2 min for both ENDO (29 ± 17 GL) and EPI (21 ± 12 GL) (p < 0.0001) and ENDO/EPI ratio was 1.39 ± 0.21 (Fig. right).





Thus, QW7437 results in increasing transmural intensities from EPI to ENDO. These data suggest that myocardial opacification by QW7437 is related more closely to vascular density than blood flow.

1004-106 Safety and Efficacy of QW7437, a New Fluorocarbon-Based Echocardiographic Contrast Agent

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Dodecafluoropentane (DFP) emulsion is a phase shift echo contrast agent which opacifies the myocardium after venous injection at doses which do not impair hemodynamics. QW7437 (QW) is an electrically altered DFP molecule which carries a net negative charge. This modification offers two theoretical advantages in enhancing myocardial opacification: 1) reduced adherence to the negatively charged vascular endothelium and 2) reduced microbubble coalescence. We conducted a study in 9 open chest dogs to assess the safety and efficacy of this novel agent. Hemodynamic parameters including HR, BP, PA pressure, PCWP, ABG, and cardiac output were measured before and serially after bolus venous injection of 0.05 ml/kg QW. Regional myocardial blood flow (RMBF) was measured before and after contrast injection using microspheres. End-systolic short axis images were acquired using an ATL HDI 3000 modified for harmonic imaging. The LAD was then occluded and repeat contrast echo imaging was performed in both fundamental (FND) and harmonic (HRM) modes. Monastral blue was then injected into the left atrium for pathologic risk area (PRA) determination. No significant changes occurred following contrast injection in either hemodynamic parameters or RMBF. Dense, global myocardial opacification was observed for greater than 2 minutes in all subjects. Background subtracted videointensity increased significantly in the mid-anterior (38.5 ± 47.3) and mid-posterior (14.4 ± 16.7) myocardium. During experimental coronary occlusion, mean pathologic risk area (0.31 ± 10) did not differ significantly from HRM echo risk area (ERA) (0.34 ± 14) or FND ERA (0.31 ± 13) (p = NS).

Conclusion: QW7437 opacifies the myocardium after venous injection at doses which do not adversely affect hemodynamics of RMBF. During experimental coronary occlusion, ERA does not differ significantly from PRA.

1004-107 Quantison™, a New Long-Living Ultrasound Contrast Agent: Experience in Human Volunteers

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A dose-finding study in human volunteers was conducted with Quantison™, a new ultrasound contrast agent, consisting of air-filled cross-linked albumin microcapsules (mc). Twelve healthy male volunteers aged between 21 and 31 years, were subjected to two intravenous doses of Quantison™. The first dose consisted of either 25, 50, 100, or 150 × 10^6 mc/kg, the second dose of 300 × 10^6 mc/kg was given 30 minutes after the first dose. Echocardiographic images (2D and color doppler) were made with a Vingmed CFM 800c and System Five, a Hewlett Packard Sonos 1500, and an ATL HDI 3000. Images were made at baseline, at 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 90 and 120 minutes. Intermittent triggered imaging was used in three subjects. Machine settings were optimized for Quantison™: maximal output power, optimal frequency transducer, and focus in the far field. Quantison™ could be clearly visualised in the LV cavity, with the Sonos 1500, HDI 3000 and System Five, and with the CFM 800c if operated in a special mode allowing higher ultrasound output. Intramyocardial contrast became visible with intermittent triggered imaging in the three subjects where this mode was used. The contrast was visible in the LV cavity for up to 30 minutes in 2D and up to 60 minutes in color doppler. Quantison™ is an unique new contrast agent, requiring higher ultrasound output for visualisation, but providing long-lasting clear intra-cavitary echo contrast in fundamental mode.

1004-108 *Microsponge* Echo Contrast Enhances Left Heart and Myocardial Perfusion Studies

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Although contrast echocardiography has the potential to provide myocardial perfusion imaging during rest and stress echocardiography, currently available agents have shown a reduced persistence when exposed to high pressures or high ultrasonic levels. To overcome this microbubble fragility, we developed gelatin-based (5 micron diameter) *microsponges*. Electron microscopy confirmed the presence of multiple (100 nanometer diameter) gas